TROTEC®

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

For industry, manual crafts and construction!

💧 *Humidity measurement*

- Air humidity
- Wood moisture
- Building moisture
- Equilibrium moisture
- Material moisture
- Dew point

🌡 *Temperature measurement*

- Air temperature
- Surface temperature
- Material temperature
  - *solids*
  - *bulk materials*
  - *liquids*
  - *gases*
  - *foodstuffs*

↯ *Velocity measurement*

- Airflow speed

precise measurements
easy to use
multifunctional

MultiMeasure

The innovative series of measurement instruments from Trotec®

MultiMeasure

The Trotec MultiMeasure series offers users in industry, manual crafts and construction a full range of measuring instruments for maintenance, damage detection and diagnosis:

Each instrument in the MultiMeasure series focuses on different practical requirements – from the ultra-compact T60 moisture meter to the versatile multi-functional measurement instrument T2000 and the system building blocks that are co-ordinated with the latter.

The instruments in the MultiMeasure series are multi-functional and impressive in terms of the precise measurements, ease-of-use and an attractive price/performance ratio.

Which equipment for which measuring task? The *MultiMeasure series* in a… …quick comparison	TP4	TP8	DL 100 C	DL100 E	DL100 F	DL100 H	DL100 M	DL100 P	T60	T200	T250	T600	T650	T2000 E	T2000 S
Humidity measurement			●	●	●	●	●	●	●	●	●	●	●	●	●
Air humidity			●	●	●	●	●	●		●	●			●	●
Wood moisture					●			●	●				①	②	●
Building moisture					●			●	●			●	①	②	●
Equilibrium moisture														●	●
Material moisture					●			●	●			●	①	②	●
Surface measurement up to 4 cm													●	●	●
Depth measurement up to 30 cm													●	●	●
Dew point			●	●	●	●	●	●		●	●			●	●
Temperature measurement	●	●	●	●	●	●	●	●		●	●			●	●
Air temperature			●	●	●	●	●	●		●	●			●	●
Surface temperature	●	●			●	●		●			●			●	●
Material temperature					●	●	●	●						●	●
High temperature measurement		●												●	●
Velocity measurement														●	●
Airflow speed														●	●
Measured data memory	1	10	120,000	240,000	240,000	120,000	240,000	120,000	–	1	1	1	1	1	1
Alarm function		●	●	●	●	●	●	●			●	●	●	●	●
Display	●	●				●	●	●	●	●	●	●	●	●	●
More information starting from page…	*3*	*3*	*4*	*4*	*4*	*4*	*4*	*4*	*6*	*6*	*7*	*7*	*7*	*8*	*8*

① Moisture measurement according to the capacitive process · ② All SDI- and Pt100 sensors from the MultiMeasure series can be connected to the T2000 E as well as compatible sensors from other manufacturers. Passive electrodes for material, wood and building moisture measurements using the resistance measuring method cannot be used with this device.

Infrared thermometers

Surface temperature

Alarm function

Scope of supply – TP4:
Measuring device, storage bag,
9V battery, user manual

Scope of supply – TP8:
Measuring device, hard case,
9V battery, user manual

With the pyrometers in the Trotec *MultiMeasure series* the optimal IR thermometer is available for every user.

T P 4
MultiMeasure-Series

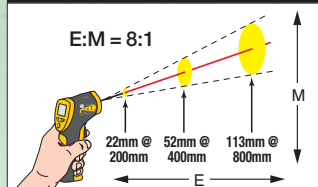The TP4 has been designed to be user-friendly without any compromises.

This pyrometer is optimally suited for all users who do not want to have to work first through lots of menus in order to get to the measured result.

People on the lookout for a fast and accurate temperature measurement method will find the optimum solution in this infrared thermometer.
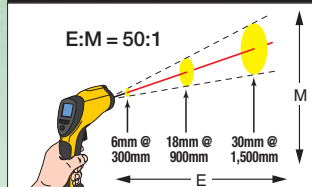
Aim, shoot and read the surface temperature from the display easily.

Features and functions at a glance…	TP4	TP8
Laser point – single laser, class 2	✓	✓
Optional Temperature display °C or °F	✓	✓
Display resolution 0.1 °C	✓	✓
Minimum and maximum temperature display	–	✓
High / low audio / optical alarm	–	✓
Differential and average value display	–	✓
Emissivity 0.95; fixed	✓	–
Emissivity – Variable, 0.1 to 1.0	–	✓
Hold displayed value	✓	✓
Backlit LCD display	✓	✓
Tripod thread 1/4-20 UNC	–	✓

T P 8
MultiMeasure-Series

For complex measurement tasks, even at high temperatures, which require particularly accurate resolution and an emissivity setting specific to the material in question, the TP8 is an optimal temperature measurement device.

For each measurement the TP8 also determines the maximum, minimum, difference and average values and presents the values as required via a function call on the display, which has back lighting and can be read very clearly, even in a poorly lit environment. For long duration measurements the TP8 can also be operated in permanent mode.

In addition this infrared thermometer has an alarm function: upper and lower alarm limits can be individually adjusted. As soon as the measured value lies outside the prescribed temperature range the acoustic alarm is automatically activated.

With a temperature measurement range from -50 °C to +1,000 °C and a high optical resolution of 50:1 this professional pyrometer is very suitable for reliable diagnostics and maintenance on heating, air-conditioning and ventilation plant, and also for general maintenance use in industry and by craftsmen.

Optical resolution TP4

E:M = 8:1

22mm @ 200mm   52mm @ 400mm   113mm @ 800mm

E

Optical resolution TP8

E:M = 50:1

6mm @ 300mm   18mm @ 900mm   30mm @ 1,500mm

E

Technical data	TP4	TP8
Temperature range	-50° to 550 °C	-50° to 1,000 °C
Accuracy (at 23 °C ± 5 K ambient temp.; the higher temp. applies)	Between -50° and -20 °C: ±5 °C; between -20° and 550 °C: ±2 % of measured value or ±2 °C	-50° to -20 °C: ±5 °C; -20° to 200 °C: ±1,5 % or ±2 °C; 201 °C to 550 °C: ±2 % or ±2 °C; 551 °C to 1,000 °C: ±3 % or ±5 °C

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

Data logger

With or without display – thanks to the large memory and the low current consumption these instruments are ideally suitable for long-term, tamperproof measurements in both mobile and stationary applications.

All data loggers in the DL series are maintenance-free, tamperproof and have a PC interface for rapid transfer of the measured data.

Ideal for long-term measurements

Depending upon the particular model the data loggers are fitted with either two or four measurement channels, permitting a very wide variety of measured parameters to be determined.

In each channel it is possible to store 60,000 measured values, in the case of the four channel models up to 240,000 individual values, therefore, while the time intervals for recording the measured values can be individually adjusted. For each item of measured data the date and time of recording are automatically stored with the item.

Wide range of sensors

With their internal sensors these data loggers are reliable measuring devices for autonomous monitoring, logging and tamperproof documentation of temperature and moisture in industrial and construction applications.

Moreover the models with additional options for connecting external sensors and electrodes open up a wide range of other applications, for example the simultaneous measurement of material moisture and temperature or the logging of the moisture content of screed, wood, plaster, bulk solids or other such materials.

An indispensable aid in the context of testing liabilities and warranty queries!

Alarm function

All instruments have an alarm function that can be separately adjusted for each measurement channel: if there is movement outside an individually defined range of values, an alarm signal is generated via an LED or display.

Variable measurement intervals

Via a software-based controller the start and end points as well as the measurement interval and recording duration can be configured for data recording purposes. Thus after the instrument has been installed on site logging can also be automatically initiated at any later point in time. Alternatively continuous measurement is possible. Here the instrument continuously records all the values measured. If the available memory limit is reached the cycle restarts automatically.

In addition the **DL100P** has a mode button with which the instrument can be set to various operating modes as required.

In addition to the logging function, with or without a display, the instrument can also be used without the recording function for the immediate display of the measured values determined. Up to four different values are then alternately displayed in pairs on the display.

On the DL 100 P and DL 100 F it is also possible to connect any of the MultiMeasure electrodes (page 11) for measurement of material moisture !
(see the info graphics on the right-hand side above)

Added value: *All data loggers can also be used as stationary data recording systems and for this purpose can be mounted on a level surface. An installation kit is provided with each instrument.*

Professional software for configuration and evaluation

Alongside a clear graphical and numerical presentation of the measured values the professional software included in the supply package also enables a dew point analysis in °C und °F. In addition it analyses and presents the absolute humidity in g/m^3. Furthermore automatic archiving of the measured data is possible, as is export into MS-Excel™. All instrument settings can similarly be configured via the software.

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

With the MultiMeasure instruments in the DL series the term data logger has been redefined.

Alongside the traditional fields of application the additional options for connecting and combining various sensors and electrodes open up a greatly expanded range of applications!

Tamperproof recording

Air temperature

Surface temperature

Material temperature
- Bulk materials
- Liquids
- Solids

Temperature alarm

Air humidity

Wood moisture

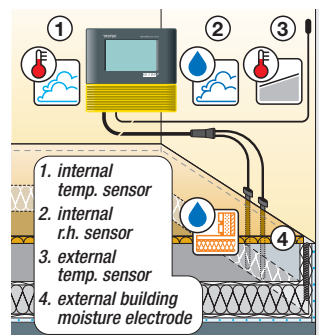**Building moisture**

Material moisture
- Bulk materials
- Solids

Moisture alarm

TS910 TS930 TS940

		Four measurement channels	**DL100E**	**DL100F**	**DL100P**
INTERNAL		Internal sensor • **Air temperature** 1x			
		Internal sensor • **Air humidity** 1x			
EXTERNAL		Temperature sensor TS910, length 6 m: • **Surface temperature** • **Material temperature** • **Internal and external ambient temperatures**	2x	1x	1x
EXTERNAL		Can be attached using the TC 20 connection cable: all the MultiMeasure TS… electrodes for moisture measurement • **Material moisture** • **Plaster moisture** • **Screed moisture** • **Wood moisture**		1x	1x

1. internal temp. sensor
2. internal r.h. sensor
3. external temp. sensor
4. external building moisture electrode

*All **four-channel data loggers** have two internal sensors for air temperature and humidity as well as two further external connection points. As a result of the ability to detect and log four different measurement parameters at the same time it is possible to use these data loggers for an extremely wide variety of applications **in industry, manual crafts and construction**. With its 6 m length of cable the TS910 external sensor has a very large radius of action, its IP 65 protection class also enables monitoring of the temperature of fluids. As far as moisture electrodes are concerned the whole of the MultiMeasure range (page 11) is available.*

Practical example: the internal sensors record room temperature and air humidity. The TS910 external sensor monitors the surface temperature of the wall (3) and the flat electrodes fitted in the edge strips monitor the moisture content of the insulation layer (4). Processes can thus be documented comprehensively!

The different equipment characteristics in a quick-comparison...

MultiMeasure data logger	DL 100 C	DL 100 H	DL 100 E	DL 100 F	DL 100 P	DL 100 M
Function and alarm display	LED	Display	LED		Display	Display
Measurement channels	2		4			2
Data memory max. measured values	120,000		240,000			120,000
Start/stop button	•	–	•	•	•	–
PC interface	RS232	RS232	USB Type B	USB Type B	USB Type B	RS232
Measurement channel 1	Internal temperature sensor; NTC					[1] 5-pole
Measurement channel 2	Internal relative humidity sensor; capacitive, HC-series					[1] 5-pole
Measurement channel 3	–	–	[2] 3.5 mm			–
Measurement channel 4	–	–	[2] 3.5 mm	[3] BNC		–
Temperature (internal sensors) — Measurement range	-20 °C … +50 °C					–
Temperature (internal sensors) — Resolution	0.1 °C for T: 0 … 40 °C, otherwise 0.2 °C					–
Temperature (external sensors)	–	–	see sensor [4]			–
Rel. humidity (internal sensors) — Measurement range	0 … 95 % r.h. or < 30 g/m³ (the lower value applies), non-condensing					–
Rel. humidity (internal sensors) — Resolution	0.5 % r.h.					–
Relative humidity (external sensors)	–					see sensor [4]
Material moisture[3] (external electrodes) — Measurement range	–	–	–	15…100 digit		–
Material moisture[3] (external electrodes) — Resolution	–	–	–	1 digit		–
Power supply / battery	3.0 … 3.7 V / LS14500C (Saft), service life approx. 1 year with an interrogation interval ≥ 1 min.					
Supply package - standard	Measurement instrument, USB cable 1 m, CD with software and instructions, Trotec factory certificate					

External sensors	TS910	TS930	TS940
Connection	3.5 mm jack plug	5-pole (M12)	5-pole (M12)
Cable length / protection type	6 m / IP 65	2 m / IP 65	2 m / IP 54
Temp. measurement principle	NTC	NTC	NTC
Temp. measurement range	-20 °C … +50 °C	-40 °C … +100 °C	-30 °C … +70 °C
Rel. humidity measurement principle	–	–	capacitive
Rel. humidity measurement range	–	–	0 … 100 % r.h.

[1] 5-pole plug connector (M12) for connection of the external sensors, TS930 (temperature) or TS940 (temperature/humidity combined sensor)

[2] 3.5 mm jack bush for connection of the TS910 external surface temperature sensor

[3] BNC plug connector for connection of an external electrode for wood and building moisture measurement

[4] dependent on the sensor connected. See technical data for the sensor.

Compact measurement instruments

With the MultiMeasure hand-held measurement instruments you have quick and easy access to all measured parameters:

- *Air temperature*
- *Surface temperature*
- *Relative humidity*
- *Absolute humidity*
- *Dew point*
- *Material moisture*

Whether for quality assurance or inspection, building construction checks, damage detection or building diagnostics investigation, the MultiMeasure series of compact measurement instruments provides you with the optimal measurement instrument for many tasks.

The T60 moisture meter, fitted with automatic function and battery test, enables the determination of wood and material moisture with only one instrument and provides a cost-effective introduction into the MultiMeasure series.

The compact professional hand-held T200, T250, T600 and T650 measurement instruments are impressive in terms of their digital precision without the disadvantage of drift in measured values exhibited by analogue instruments.

All four instruments are based on a standard concept of operation that allows the simplest kind of one-handed operation using an innovative thumb-wheel.

All MultiMeasure hand-held measurement instruments stand out in terms of the very simple kind of one-handed operation, a robust and compact housing and their attractive price/performance ratio.

T60
Moisture meter

Wood moisture

Building moisture

Compact hand-held instrument for rapid determination of the material or wood moisture content using the resistance method.

An optimal application for the T60 is the rapid indication of wood moisture content in cut timber and firewood. In addition the instrument can be used to record moisture in soft building materials such as cement or plaster. **The T60 serves a wide variety of possible applications and is impressive in its simplicity of operation:** take off the protective cap - insert the electrodes into the material – that's all.

- *Wood and material moisture measurements with one instrument*
- *Dual scale for wood moisture and material moisture*
- *Ready for immediate use*

T200
Thermohygrometer

Air humidity

Air temperature

This digital, hand-held measuring instrument determines **air temperature** (°C, °F) and **relative humidity** and displays both values simultaneously in the well legible display.

In addition to the continuous real time display of temperature and relative humidity, not only the **minimum and maximum values** but also the **average and "hold" values** can be displayed – all in a split second and by one-handed operation with the thumbwheel.

The **absolute humidity** (g/m³) or the **dew point temperature** (dp °C) of the air can be displayed in addition to the relative humidity (r.h.).

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

T250
Infrared-Thermohygrometer

Air humidity

Air temperature

Surface temperature

Dew point alarm

This innovative hand-held measuring device opens up new dimensions in application variety for the user:

Depending on the application mode, the T250 provides you with a thermohygrometer, a laser pyrometer or a combination of the two!

In the **TH mode** the measuring instrument corresponds to the T200 and offers you all the functions of this thermohygrometer.

In the **IR mode** you can use the T250 as a laser pyrometer for surface tempera-

ture measurement with measurement location marking. In the upper measured value display the real time value is displayed continuously and in the lower measured value display either the corresponding minimum, maximum, average or "hold" value.

A new feature of the T250 is the DP mode with alarm function:

This closes the gap between dew point temperature determination and surface temperature measurement!

In the **DP mode** the dew point temperature and the surface temperature are displayed simultaneously in the well visible display. As soon as the wall temperature is below the dew point temperature, the T250 alerts the user with an optical laser signal and an alarm tone.

Wall surfaces can be examined in no time and weakpoints detected quickly with the alarm function. The alarm thresholds are individually configurable.
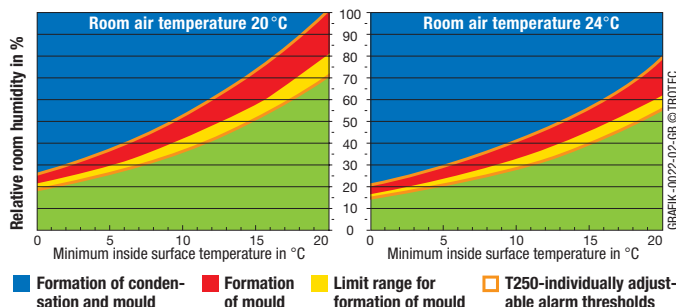
T600
Moisture meter

Material moisture
Sub-surface moisture

Moisture alarm


Sub-surface moisture

Digital microwave moisture measurement instrument with permanent real-time display of the material moisture values **for non-destructive moisture measurements at a material depth of up to 30 cm.**

In combination with the T650 measurement of surface and depth moisture over a grid pattern enables meaningful results to be achieved in terms of a multi-dimensional moisture distribution!

T650
Moisture meter

Material moisture
near to surface

Moisture alarm

Surface moisture

Digital, hand-held measuring instrument for **fast, destruction-free determination of moisture distributions** in areas up to 4 cm away from the surface.

Damp and dry wall and floor areas can be detected **by permanent real time display** of the measured values. In addition, the device is suitable for preliminary inspection of the maturity of building materials in CM measurements.
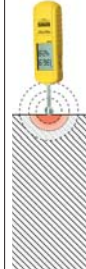
Both material moisture measurement instruments can also display **minimum, maximum and "hold" values.** An **individual alarm limit** can also be defined.

Advantages of the alarm function of the T600 and T650:

By means of the alarm function large wall or floor areas can be measured quickly and effectively. The user can concentrate on the target without having to monitor the measured values all the time on the display: **if the selected digital limit is exceeded, the T600 and T650 alert the user by means of an acoustic signal!**

Room air temperature 20 °C

Room air temperature 24 °C

Relative room humidity in %

Minimum inside surface temperature in °C

Minimum inside surface temperature in °C

GRAFIK-0022-02-GB © TROTEC

Formation of condensation and mould

Formation of mould

Limit range for formation of mould

T250-individually adjustable alarm thresholds

T2000

Industry, trade, surveyors and architects expect from a "real" multifunctional measuring instrument for material and building diagnosis:

- **reliability**
- **flexibility**
- **security of investment**

The T2000 unites all these requirements

The rugged housing can withstand rough operating environments and the one-handed operation with the thumbwheel allows the user to concentrate on the measurement.

The large, illuminated display is well legible even in poor light conditions and the numeric values can easily be recorded photographically – an advantage for stocktaking or damage assessment. And of course the T2000 displays either date or time for every measurement: Practical for photographic documentation.

Digital precision...

The heart of the T2000 is a 24-bit analogue/digital converter which supplies long-term stable, precision results which analogue instruments cannot achieve even in a rough environment. The digital technology of the "Serial-Digital-Interface" (SDI) opens up a new dimension in flexibility in measuring missions for the user.

With the T2000 you have one single measuring instrument for many tasks instead of many instruments for one task!

Full range of sensors and electrodes...

Another decisive practical advantages is the flexibility of the T2000.

The new concept of a universal basic unit supplemented by interchangeable sensors means that the user no longer needs to carry around a whole assortment of measuring instruments.

About 30 sensors and electrodes are available and allow many different parameters to be measured.

In addition to the innovative SDI sensors, the T2000 programme also includes different Pt100 sensors for temperature measurement as well as round, flat and layer depth electrodes for wood and building moisture measurement.

PRACTICAL ADVANTAGES:

- Multifunctional measuring instruments with digital precision without the measured value drift disadvantage of analogue instruments.

- SDI input for serial sensors such as temperature, relative humidity, flow speed and destruction-free humidity measurement

- Input for Pt100 sensors for temperature measurement

- BNC sensor input for precision material moisture measurement *(only T2000 S)*

- Downward-compatible with analogue OEM sensors

- Large back-lit display

- Thumbwheel enables simple one-handed operation

- Rugged housing

- Excellent price/performance ratio

* Information available on request

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

T2000 – One measuring instrument for many applications:

- Air humidity
- Wood moisture
- Building moisture
- Moisture alarm
- Material moisture
- Equilibrium moisture
- Dew point
- Air temperature
- Material temperature
- Wood temperature
- Surface temperature
- Food temperature
- Gases temperature
- Bulk material temperature
- Liquids temperature
- Airflow speed

A development from practice for practice…

Extensive tests with experienced users, research institutes and trade associations have proven the high practical capabilities of the T2000.

The device is suitable both for classic applications in industrial and construction diagnostics and for many areas of the building trade such as floor and tilers, painters and carpenters who need to test the moisture content of walls, floors and wood.

Temperature compensation with and without an external sensor is possible in wood moisture measurement.

The T2000 has a menu option which allows selection of hundreds of different kinds of wood specially for measuring the moisture content of wood materials!

It is backed up by many validated material curves stored in the software which can be selected from the T2000 wood type table with the appropriate material number.

A detailed list containing more than 5,000 trade names of approx. 500 types of wood including botanical names and family classifications is available on request.
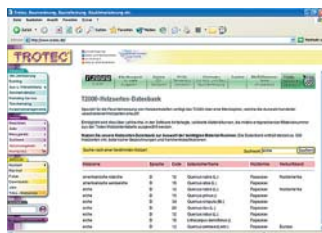
In our wood classification database (www.trotec.com) all material numbers can be determined in an individual search – even using international nomenclature.

Low price – great variety – security of investment…

The T2000 unites digital technology, high quality equipment and numerous advantages not only in a very attractive price/performance ratio but also enables reasonable use of previous investments.

Because the T2000 is open to many sides and builds a bridge between analogue and digital technology.

In addition to the Trotec sensors you can not only connect electrodes from other manufacturers to the device with adapter cables but will also be able to combine future sensor developments with the T2000.
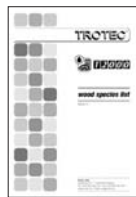
In this way you can continue to use your existing sensors and at the same time profit from the additional advantages of the SDI sensors and future sensor solutions!

T2000 – as diverse as your work

The T2000 design follows the thinking that instead of having many measuring devices for separate applications it would be better to have a single measuring device for lots applications. With the T2000, flexibility begins with the choice of device:

There are two different models available….

The **T2000 S** will equip you optimally for the most diverse measurement applications because you can attach to it all sensors in the MultiMeasure programme and compatible non-Trotec sensors.

The **T2000 E** is the cost-effective solution for all users who, for their measurements, don't need the T2000 S' BNC connector to attach passive electrodes according to the resistance method for their measurements, but don't wish to miss out on the T2000's many advantages.

Connection options for T2000 E and T2000 S models:

The T2000 E and T2000 S are fitted with a 5 pin plug connector to which you can attach Trotec SDI- and Pt100 sensors and is also compatible with non-Trotec sensors*.

Connection to the 5 pin plug connector (A):
- **Trotec SDI sensors** with TC 30 SDI connecting cable
- **Trotec Pt100 sensors** (5-pin plug connector usually integrated)
- **Non-Trotec sensors*** with TC 10 adapter cable

The T2000 S also has a BNC input which supports the connection of electrodes for building and wood moisture measurement according to the resistance principle (Ohm's Law).

Connection to BNC input (B):
- **Passive Trotec wood and building moisture sensors** with TC 20 connecting cable
- **Non-Trotec sensors*** with TC 20 adapter cable
- * Info available on request

SDI sensors –
simply operation,
intelligent
technology…

SDI sensors are sensors with a "Serial digital interface". Both T2000 models have a 5-pin plug connector to which various SDI sensors can be attached to allow the display of a vast range of measured values on the device itself.

In this case values such as air temperature, relative humidity, absolute humidity, dew point, material moisture and airflow speed are independently calculated by the SDI sensor and transmitted to the device.

The digital technology avoids the drifting that occurs with analogue devices!

All calibration settings are also saved directly in the SDI sensor. A works certificate enclosed with every T2000 documents the accuracy of the measurements.

If site conditions require other measurements to be determined, in order for example to be able to determine correlations or because new aspects arise to be taken into consideration during the measurement process, you simply change the sensor – thereby turning a thermohygrometer into a microwave moisture sensor or a capacitive moisture sensor into an anemometer.

You do not need to adjust any device settings when exchanging sensors:

Thanks to its intelligent technology the T2000 automatically detects which sensor is attached when the SDI sensors are changed.

Simple operation continues throughout the measurement. Not only the minimum and maximum values but also average and "hold" values can be displayed – all in a split second and by one-handed operation with the thumbwheel.

The T2000 also has a side locking slit in which the sensors can be held.

In this way, measurements and device settings can be carried out single-handedly, leaving your other hand free for other activities!

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Compact measuring instruments

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SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

Climate measurement

Air temperature and air humidity

TS 200 / 220 / 240 SDI – climate sensors

For measuring **air temperature** and **humidity**. **Relative humidity** (r. h.), **absolute humidity** (g/m^3), air temperature (°C, °F) and **dew point temperature** (dp °C, dp °F) are determined.

Temperature and humidity measured values are shown simultaneously in real time on the display of the T2000.

Minimum, maximum, average and "hold" values can be displayed optionally in addition to the measured value.

Since there is frequently a heavy accumulation of dust and dirt under practical conditions which can lead to falsification of the measuring results and shortening of the sensor life, the TS 200 SDI ❶ is **already equipped with a metal grid filter as a standard** *(measurement range -20 to 70 °C; 0 to 98 % r. h.)*.

A high grade steel sinter filter ❷ is optionally available for environments with heavy soiling.

The 250 mm long stainless steel TS 220 SDI ❸ sensor fitted with a Teflon filter enables high temperature measurements, e.g. of drying processes up to 140 °C, and up to 180 °C in the short-term *(measurement range -40 to 140/180 °C; 0 to 100 % r. h.)*.

The TS 240 SDI ❹ climate sensor is 250 mm long with a diameter of just 4 mm. It is therefore ideal for temperature and moisture measurements in confined places and for hygrometric comparative measurement in drilled holes > 4 mm *(measurement range -40 to 100 °C; 0 to 100 % r. h.)*.

Moisture measurement

Surface moisture

TS 300 SDI – capacitive moisture sensor

The area of application of the TS 300 SDI ❺ is in the **non-destructive determination of moisture dis- tributions in areas up to 4 cm away from the surface** *(measurement range 0…200 digit)*.

The TS 300 SDI can display **average, minimum, maximum and "hold" values.**

Sub-surface moisture

TS 350 SDI – microwave moisture sensor

With its microwave technology, the TS 350 SDI ❻ is suitable for **non-destructive moisture measurement up to a material depth of 30 cm** *(measurement range 0…200 digit)*.

Another advantage is the **independence from the degree of salination of the material**. It therefore makes no difference to the microwave technique whether an older or a new building (hygroscopicsigns of moisture) is measured.

Alarm function

Additionally an individual alarm limit can be defined with both moisture sensors.

Advantage of the alarm function: Large areas can also be measured quickly and effectively. The user can concentrate on the target without having to watch the measuring results on the display the whole time.

As soon as the selected limit is exceeded, the sensor alerts the user with an acoustic signal!

Velocity measurement

Airflow speed

#### TS 400 / 420 / 460 SDI – anemometer sensors

With these sensors it is possible to measure **airflow speed** and **temperature** simultaneously. **Minimum, maximum, average and "hold" values** can be displayed optionally in addition to the measured value.

The anemometer sensor TS 400 SDI ❼ *(measurement range 0 to 50 °C; 0 to 20 m/s, accuracy approx. ±0.2 m/s)* is not only suitable for checking the distribution of flow and temperature in air conditioning and climate control systems but also for pinpointing weakness when demonstrating the air density of buildings (Blower Door).

Reconstruction companies also use it to check the capacity of their drying installations in insulation layer drying because this sensor allows them to determine quickly and exactly whether there is sufficient flow of air at the relief openings to dry out the insulation layer!

For measurement jobs requiring particularly precise results, particularly with small flow values up to 2 m/s, the TS 420 SDI ❽ anemometer sensor can offer a degree of accuracy of 0.04 m/s *(measurement range 0 to 50 °C; 0 to 2 m/s)*.

As a cost-effective standard anemometer sensor the TS 460 SDI ❾ is also available. Almost precise as the TS 400 SDI, but fitted with a polycarbonate tip (ø 12 mm) rather than one of stainless steel.
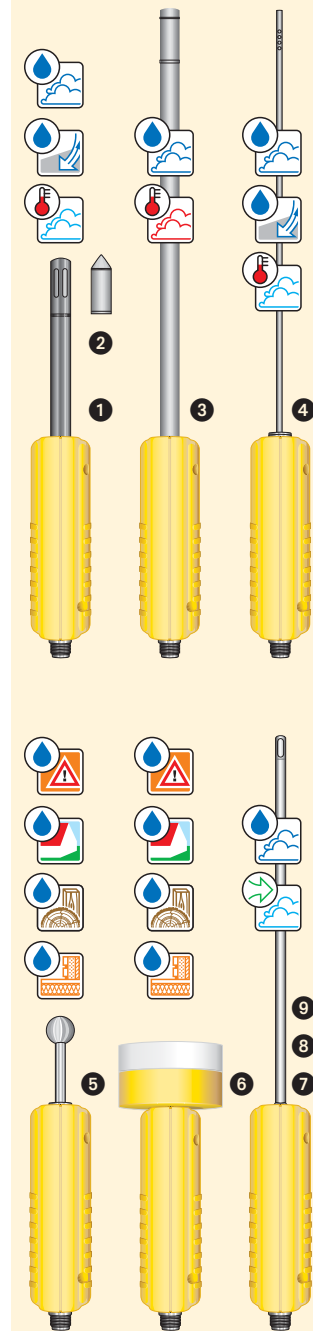
Pt100 sensors for temperature-measurement

With the Pt100 sensors, **minimum, maximum, average and "hold"** values can be displayed in the second display in addition to the real time temperature values of solids, bulk goods, liquids, gases or foodstuffs in T2000 measuring applications.
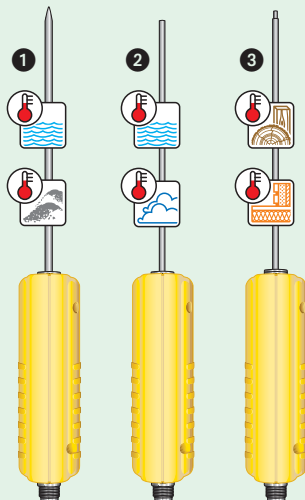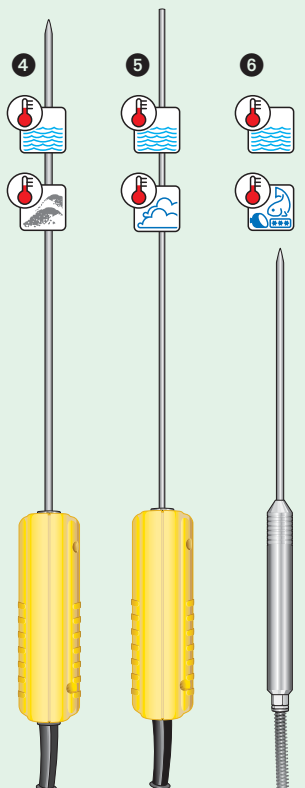
**❶ TS 110/150 –
insertion temperature sensors**

The class B sensor with a 150 mm long measuring tip (ø 4 mm) is particularly suitable for temperature measurement in liquids (e.g. water) or bulk goods (e.g. sand). Measuring range -40 °C … +400 °C.

**❷ TS 120/150 and
❺ TS 120/300 – immersion
and flue gas temperature sensor**

The robust TS 120 sensor is available with a tip length of 150 mm (ø 3 mm) and 300 mm (ø 3 mm). The precision class A sensor is particularly suitable for temperature measurement in liquids (e.g. water) or flue and exhaust gases of burner units. Measuring range -40 °C…+400 °C.

**❸ TS 130/150 –
surface temperature sensor**

The head of the 150 mm long measuring tip (ø 4.5 mm) carries a spring-loaded sensor which picks up the surface temperature. The class B sensor is particularly suitable for use of temperature compensation in determining moisture content of wood. The shape allows accurate determination of the surface temperature.

**❹ TS 125/300 – high-precision
insertion temperature sensor**

The class 1/10 DIN B sensor with a 300 mm long measuring tip (ø 4 mm) is particularly suitable for high-precision temperature measurement in liquids (e.g. water) or bulk goods (e.g. sand). Measuring range -40 °C … +400 °C.

**❻ TS 140/150 – insertion
temperature sensor**

This class B sensor has a high grade steel handle and measuring tip (ø 4 mm) as a special feature and is therefore particularly suitable for temperature measurement in foodstuffs. Measuring range -40 °C … +400 °C.

Electrodes for measuring moisture content of wood and buildings:

Different types of passive electrodes are used for determining the material or wood moisture and the humidity of mineral or porous building materials such as plaster or screed according to the resistance measuring method.

The **minimum, maximum, average and "hold" values** can be displayed with these electrodes in addition to the real time values when measuring with the T2000 *(S model only)*.
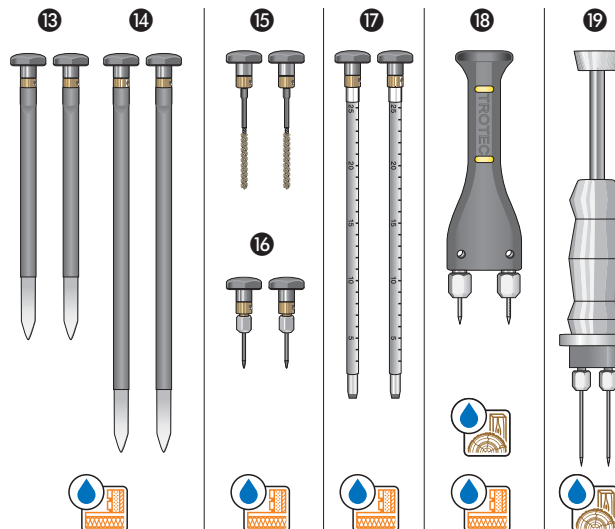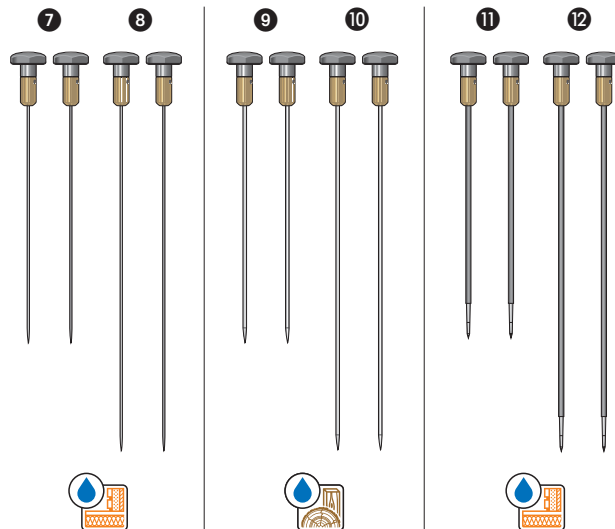
❼ TS 4/200 and
❽ TS 4/300 round electrodes

Very thin insertion electrodes (uninsulated, ø 2 mm) for moisture measurement in building and insulating materials through joints or cross joints. Available in lengths 200 mm (TS 4/200) and 300 mm (TS 4/300).

❾ TS 8/200 and
❿ TS 8/300 round electrodes

Uninsulated insertion electrodes (ø 4 mm) for measuring moisture on loose mounds such as wood wool or shavings. Available in lengths 200 mm (TS 8/200) and 300 mm (TS 8/300).

⓫ TS 12/200 and
⓬ TS 12/300 round electrodes

Insulated electrodes (ø 4 mm) for specific moisture measurement in concealed component levels where the electrode shaft needs to be insulated.

Absence of insulation would falsify the measuring result. The most frequent use is the determination of moisture distribution of multilayered wall or ceiling structures such as floating screeds, multilayered walls, wooden beam ceilings, hot roofs etc.

Available in lengths 200 mm (TS 12/200) and 300 mm (TS 12/300).

⓭ TS 16/200 and
⓮ TS 16/300 flat electrodes

The area of application corresponds to the area of application of the insulated round electrodes TS12/200 and TS12/300. The advantage of the flat electrodes (1 mm flat) is that there are no holes in the surface and the electrodes can be inserted through the edging strip after removing the base. Available in the lengths 200 mm (TS 16/200) and 300 mm (TS 16/300).

⓯ TS 20/110 brush electrode

With 110 mm long brush head (ø 7 mm) and insulated shaft. The area of application is the specific measurement of moisture in a homogeneous building material without using a contact mass. The connection to the goods to be measured is made by the brush head.

⓰ TS 50 insertion electrodes

The two-part insertion electrode TS 50 enables the variable distance when positioning the electrode pins. The area of application is the measurement of moisture in hard building materials such as concrete or screeds.

The two hexagon union nuts also allow replacement of the following available electrode pins:

- 20 mm *(max. penetration depth 14 mm)*
- 30 mm *(max. penetration depth 24 mm)*
- 40 mm *(max. penetration depth 34 mm)*
- 60 mm *(max. penetration depth 54 mm)*

⓱ Layer depth electrodes TS 24/250

The area of application is the specific layer moisture measurement in homogeneous building materials using the contact mass. The material humidity can be determined according to the length up to a maximum depth of approx. 250 mm. The electrode is made up of the electrode tube and the electrode rod. The electrode tubes (ø 8 mm) are insulated and equipped with a depth scale so that the measured value can be measured at the desired measuring depth.

⓲ TS 60 hand electrode

Unbreakable plastic handle with two hexagon union nuts in which electrode pins of the following lengths can be inserted.

- 20 mm *(max. penetration depth 14 mm)*
- 30 mm *(max. penetration depth 24 mm)*
- 40 mm *(max. penetration depth 34 mm)*
- 60 mm *(max. penetration depth 54 mm)*

Areas of application are measurement of moisture in cut timber or wooden board materials (e.g. chipboard or fibre boards) and measurement of moisture in soft building materials such as plaster or roughcast mortar.

⓳ TS 70 hammer electrode

With moving hammer handle for precision zone and depth measurement especially in woods with different moisture distribution, e.g. liquid nests using tefloncoated electrode pins. These are available in lengths of 45 and 60 mm.

MultiMeasure accessories:

MultiMeasure case 1
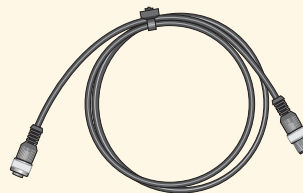Compact case for measuring device, SDI sensors, electrodes, cables and accessories.

MultiMeasure case 2
If the microwave sensor TS 350 SDI is to be part of the delivery scope, we recommend you to use this bigger case.
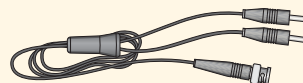
TC 30 SDI connecting cable
for connecting the SDI sensors to the T2000.

TC 20 connecting cable
for connecting Trotec electrodes for building and wood moisture measurement as well as other makes of sensors to the BNC connection of the T2000 *(only T2000S)*.

TC 10 adapter cable
for connecting OEM sensors to the 5-pin connector of the T2000.


Telescopic rod
For the connection of SDI sensors. Ease of measurement for locations that are deep down or high up, and difficult to access.

High grade steel sinter filter
for T200, T250 and TS 200 SDI. Replaceable protective cap for areas of application with heavy soiling.

Calibration block
For single-point calibration (r.h.) of the T200, TS 200 SDI and TS 220 SDI using the appropriate calibration ampoules (supplied without sensor and ampoules).
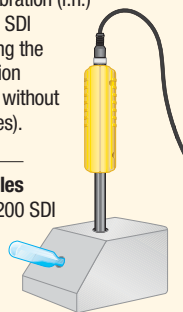
Calibration ampoules
for T200, T250, TS 200 SDI and TS 220 SDI available for 35, 50 and 80 % moisture.

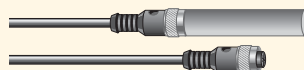**Tefloncoated electrode pins**
Available in lengths of 45 and 60 mm.

Spare electrode pins
uninsulated.

Contact mass

Sensors for DL100 data logger:

TS940 combination sensor (temperature and relative humidity) for the DL100 M, cable length 2 m.

TS930 temperature sensor for the DL100 M, cable length 2 m.

TS910 temperature sensor for the DL100 E, DL 100 F, DL 100 P, cable length 6 m.

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

A measuring device made for real situations

Of interest to architects, building services managers, renovators, craftsmen…

… when measuring building materials moisture levels, for example. Use the T2000 to determine hidden humidity - distributions, for example in finished floors with sound-proofed covering, multilayer insulated brickwork, insulated flat roofs or hidden beams in timbered houses. In the T2000 practice handbook you will find many tips and descriptions of practical procedures when faced with different types of moisture damage.
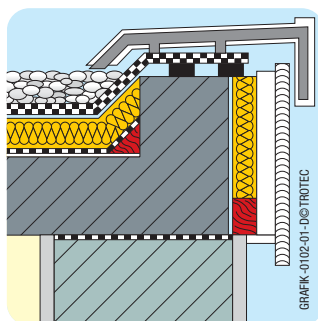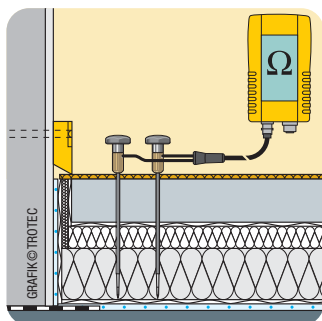

Combination measurements in building diagnostics…

The combined use of surface and sub-surface moisture sensors allows you to map, limit and classify complex relationships, e.g. hygroscopic humidity occurrences due to salt build-up or to locate seal breaches and leaks.

The TS 300 SDI capacitive moisture sensor detects the top 2 to 4 cm of the building material while the TS 350 SDI microwave moisture sensor measures the volumetric humidity values up to depths of 30 cm. High humidity values in surface areas are barely considered by this sensor.

Carrying out raster measurement using both measurement processes on the basis of surface and sub-surface measured values will give reliable results about multi-dimensional moisture distribution.

Figure left (Surface representation of the measured values with MS-Excel™): Rising humidity can also be diagnosed with the combined use of both sensors. The sub-surface moisture measurement (below) in the brickwork yielded significantly higher values than the surface moisture measurement (above).
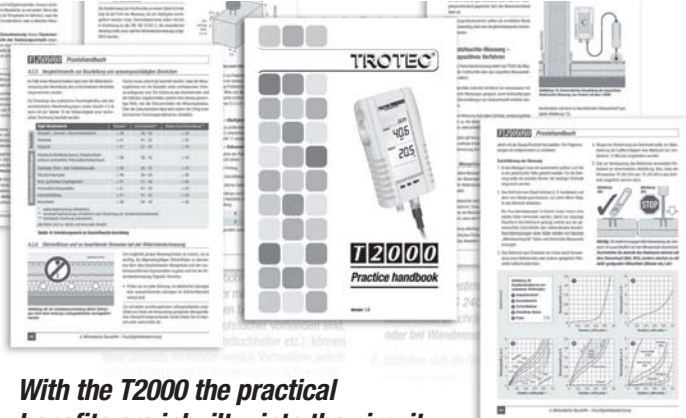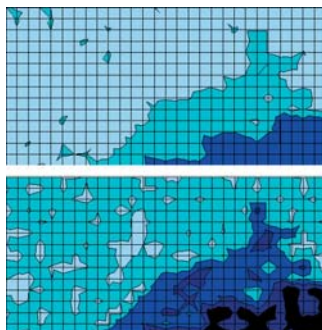
With the T2000 the practical benefits are inbuilt – into the circuit board <u>and</u> on paper…

The T2000 not only allows you to determine the most diverse of measured variables simply and accurately, the focused combination of the different sensors and measurement processes but also enables time-saving investigation and sound analysis even of complex problems.

To ensure that you profit directly from the most effective process methodologies in different application areas we offer a comprehensive practice handbook for the T2000 user.

Along with current research results, physical principles with respect to the different measurement processes and actual descriptions of particular measurement applications, the T2000 practice handbook contains almost 70 pages of practical tips, examples of uses for combination measurements and actual procedural instructions for typical problems.

A well-written technical book with valuable practical expertise which you can put into practice in your measurement jobs.

Process optimisation, preventive maintenance, damage analysis…

For industry…

…and manual crafts!

The T2000 with its combined sensors can be used for many jobs in industry and craft.

From analysis of air inlet and outlet flows, build-up of condensation, insufficient cooling of machinery, porous seals, heat build-up, air humidity fluctuations, to materials that are too dry or too wet – for both preventive maintenance, and also for structural diagnostics and damage analysis, you can **undertake a very wide variety of tasks with just one instrument!**

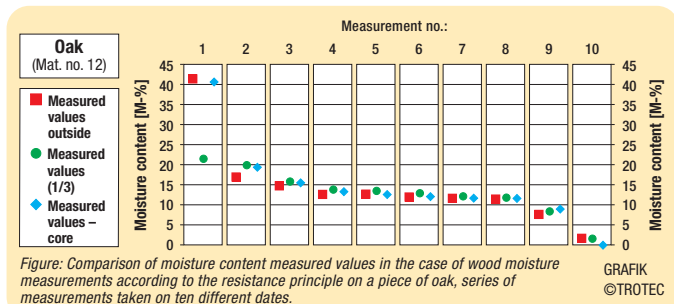## Ideal for joinery workshops, timber processing, forestry companies, the timber trade…

Whether forestry management, timber transport, wholesale trade, furniture joinery or building carpentry – with the possibility of rapid combination of various measurement techniques with only one instrument the T2000 S is suitable for many companies in timber production and processing, for example for…
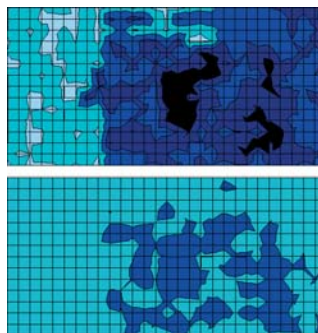

- **monitoring of drying processes**
- **quality control of timber deliveries**
- **documentation of the processing quality**
- **analysis of environmental conditions in shop fitting or furniture construction**
- **damage assessment and causal analysis in the event of claims**

Precise moisture measurements of a very wide range of types of woods are no problem with the T2000. For temperature compensation – e.g. for cold wood or measurements taken during wood drying – you can attach a Pt100 sensor to the instrument in addition to the moisture measurement electrode. The T2000 recognises the temperature sensor and compensates automatically for temperature differences.

Research work carried out by the Institute for Building Research at the RWTH Aachen, Germany, showing the accuracy of resistance measurement using the T2000 in a comparison of kiln drying, is thoroughly documented in the T2000 manual of best practice. As an example of the results of the comprehensive series of trials the following chart shows the measurement results determined on a piece of oak.

Figure: Comparison of moisture content measured values in the case of wood moisture measurements according to the resistance principle on a piece of oak, series of measurements taken on ten different dates.

GRAFIK ©TROTEC

Causal analysis of fungal growth due to condensation humidity…

Application example (figure):

The humidity raster determined by combined measurement using surface and sub-surface sensors indicates condensation humidity:

While the figure above shows strong humidity at the surface (dark areas), the lower figure shows that the internal mortar is largely dry (light areas).

(Surface representation of the measured values with MS-Excel™)

Practical accessories: Extension handle for ease of measurement in locations that are difficult to access. Can be used with all SDI sensors.

The T2000 is as flexible as its tasks are various…

The examples presented show only a small selection of the many practical advantages that use of the T2000 can offer you.

The best solution is for you to convince yourself of the many advantages of this multifunctional measuring device. **Put together your personal measurement case according to your individual requirements - you will find an overview of the complete T2000 programme on the reverse of this sheet…**

Diagnosing condensation humidity problems in homes is usually simple and reliable using combined TS 300 SDI and TS 350 SDI sensors.

Condensation humidity is manifested in many cases in increased humidity content in near-surface areas while deeper inside the brickwork it remains dry.

If additional room climate measurements using the TS 200 SDI (rel. humidity, room temperature and dew point temperature) can verify that the temperature and air conditions in the affected areas confirm the results of the measurements, for example, in the wall area, one can conclude that the ventilation is defective.

However, if the sub-surface measurement using the TS 350 SDI also indicates increased humidity values, this may suggest further causes for the humidity problem (e.g. leaking risers, gutters or drains etc.).

For this kind of problem you need just one device, the T2000, to carry out all the measurements!

Pyrometer

Data logger

Compact measuring instruments

Multifunctional measuring instruments

SDI sensors

Pt100 sensors, electrodes and accessories

Practical advantages

Overview delivery program MultiMeasure series	Article no.
Pyrometer	
☐ TP 4	ZB9100190
☐ TP 8	ZB9100193
Data logger	
☐ DL 100 C	ZB9100112
☐ DL 100 E	ZB9100113
☐ DL 100 F - 4 K	ZB9100114
☐ DL 100 H - 2 K / Display / internal sensors	ZB9100115
☐ DL 100 M - 2 K / Display / external sensors	ZB9100117
☐ DL 100 P - 4 K / Display / external sensors	ZB9100118
Sensors for datalogger	
☐ TS 910 temperature sensor	ZB9100145
☐ TS 930 temperature sensor	ZB9100141
☐ TS 940 combination sensor temperature / rel. humidity	ZB9100140
Compact measuring instruments	
☐ T 60 Moisture meter	ZB9110002
☐ T 200 Thermohygrometer	ZB9110004
☐ T 250 Infrared-Thermohygrometer	ZB9110007
☐ T 600 Moisture meter (microwave)	ZB9110012
☐ T 650 Moisture meter (capacitive)	ZB9110014
Multifunctional measuring instruments	
☐ T 2000 E	ZB9110215
☐ T 2000 S	ZB9110210
SDI sensors	
☐ TS 200 SDI climate sensor	ZB9112001
☐ TS 220 SDI climate sensor	ZB9112006
☐ TS 240 SDI climate sensor	ZB9112004
☐ TS 300 SDI capacitive moisture sensor	ZB9112002
☐ TS 350 SDI microwave moisture sensor	ZB9112005
☐ TS 400 SDI anemometer sensor	ZB9112003
☐ TS 420 SDI anemometer sensor	ZB9112007
☐ TS 460 SDI anemometer sensor	ZB9112008
Pt100 sensors	
☐ TS 110/150 PT 100 insertion temperature sensor, ø 4 m	ZB9111501
☐ TS 120/150 PT 100 immersion and flue gas temperature sensor, ø 3 m	ZB9111505
☐ TS 120/300 PT 100 immersion and flue gas temperature sensor, ø 3 m	ZB9111507
☐ TS 125/300 PT 100 high-precision insertion temperature sensor, ø 4 m	ZB9111508
☐ TS 130/150 PT 100 surface temperature sensor, ø 4 m	ZB9111510
☐ TS 140/150 PT 100 insertion temperature senso	ZB9111515
** further information available on request	

Overview delivery program MultiMeasure series	Article no.
Material moisture electrodes	
☐ TS 050 insertion electrodes	ZB9111100
☐ TS 060 hand electrode	ZB9111105
☐ TS 070 hammer electrode	ZB9111110
☐ TS 004/200 round electrodes, ø 2 mm	ZB9111010
☐ TS 004/300 round electrodes, ø 2 mm	ZB9111015
☐ TS 008/200 round electrodes, ø 4 mm	ZB9111020
☐ TS 008/300 round electrodes, ø 4 mm	ZB9111025
☐ TS 012/200 round electrodes insulated, ø 4 mm	ZB9111030
☐ TS 012/300 round electrodes insulated, ø 4 mm	ZB9111035
☐ TS 016/200 flat electrodes insulated	ZB9111040
☐ TS 016/300 flat electrodes insulated	ZB9111045
☐ TS 020/110 brush electrodes insulated	ZB9111050
☐ TS 024/250 layer depth electrodes, ø 8 mm	ZB9111055
Cables	
☐ TC 10 adapter cable for non-Trotec sensors**	ZB9119010
☐ TC 20 connecting cable BNC	ZB9119011
☐ TC 30 connecting cable SDI sensors	ZB9119012
Further accessories	
☐ Stainless steel sinter filter T200/T250/TS 200 SDI	ZB9119016
☐ Stainless steNokel sinter filter T200/T250/TS 200 SDI	ZB9119003
☐ Electrode pins TS 70/45 mm, tefloncoated	ZB9119001
☐ Electrode pins TS 70/60 mm, tefloncoated	ZB9119002
☐ Spare electrode pins, uninsulated	ZB9119015
☐ Calibration ampoules, 35 %, 50 % or 80 %	ZB9119005
☐ Calibration block	ZB9119004
☐ Contact mass for TS 4/TS 24	ZB9119013
☐ MultiMeasure case 1	ZB9119014
☐ MultiMeasure case 2	ZB9119017
☐ Extension handle	ZB9119018

You can obtain further information from your MultiMeasure sales partner:

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